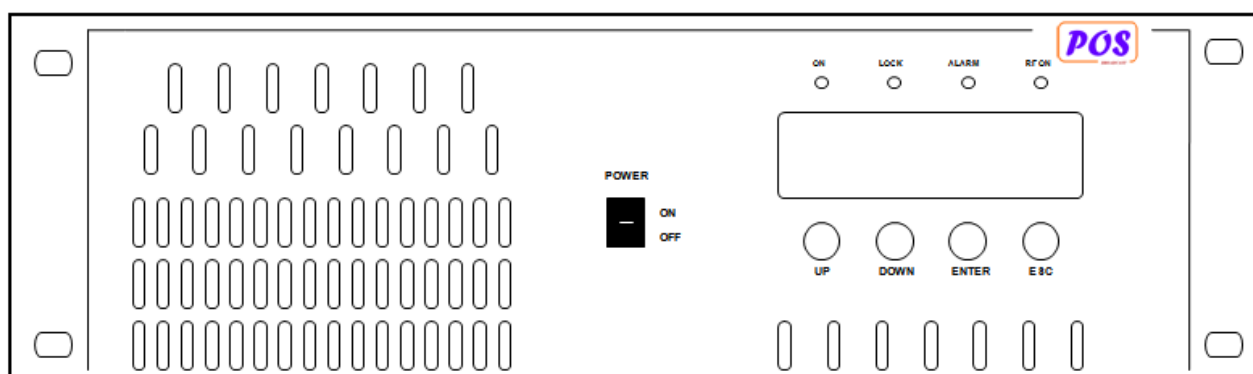


## POS-1000T+



## User Manual

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## **1. General Description**

The POS-1000T++ is an exciter for Frequency Modulated audio broadcasting in a frequency modulation able to transmit in the band between 87.5 and 108 MHz with an output RF power adjustable up to a maximum of 1000 W

Outstanding audio features this device has are low distortion and inter modulation values and the high signal to noise ratio. Another important feature the POS-1000T+ has is its great simplicity of construction and use.

The POS-1000T+ was designed to be modular. Its various functions are run from modules directly connected to each other with male and female connectors or with flat cables ending in connectors. This type of design makes maintenance operations and any required module replacement easier. All models are made with SMD technology.

This exciter contains a low-pass filter that reduces the harmonic emissions to below the limits allowed by international regulations, and can therefore be used as a transmitter connected directly to the antenna.

The machine is offered in two versions, one for Mono or MPX input (wideband input that is useful when you want to transmit in stereo using an external stereo encoder) and the other with an integrated stereo encoder. The POS-1000T+ stereo encoder guarantees excellent stereo separation together with a low harmonic distortion level. Also the stereo version of the exciter can be configured for operating in Mono/MPX mode (meaning excluding the stereophonic coder and using the "left" input as the "mono" input and the BNC as the "MPX").

The user can do the configuration through micros witches that are accessible from the outside. Both versions have two inputs (SCA1 and SCA2) for modulated signals on sub carriers from special external encoders normally used in Europe for RDS (Radio Data System) transmission.

The microprocessor system includes an LCD display and push-button panel for inter action with the user, and implements the following functions:

- Setting the output power
- Setting the operating frequency
- Measurement and display of the working parameters of the exciter

The exciter's management software is based on a menu system. The user can navigate between the various submenus by using four push buttons: UP, DOWN, ENTER and ESC.

---

## **2. Installation and use Description**

This chapter contains the necessary information for installing and using the machine. In the event any aspects are not completely clear, for example when using the machine for the first time, we recommend you carefully read the entire description contained in this manual.

### **2.1 Preparation**

Unpack the exciter and before doing any other operation, be sure it has not been damaged during transport. In particular check that all the connectors are in perfect condition.

The main fuse can be accessed from the outside on the rear panel. Extract the fuse carrier with a screwdriver to check its integrity or for replacement, if necessary. The fuse to be used is this type 15A @220VAC

Check that the POS-1000T+ switches are in the "OFF" position. The exciter has one switch for the mains power supply cable and completely interrupts the machine's mains power supply.

Connect the RF output of the exciter to the antenna cable or to a fictitious load 50 ohm.

Connect the mains cable.

Connect the earth cable.

Connect the audio cables of the signal source to the proper connectors on the back of the exciter.

### **2.2 Use**

Check that the POS-1000T+ switches are in the "ON" position.

Enter the "ESC" menu and "ENTER" to set the desired operating frequency.

By using the switches and trimmer found on the rear panel, set the characteristics (impedance, pre emphasis and, if it's necessary, stereo/mono) and the levels of the audio and RDS input.

Set the desired power level from the LCD menu.

### **2.3 Settings and calibration**

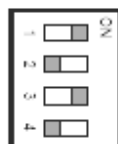
A trimmer for each one of the exciter's inputs is on the rear panel of the device. The printing on the panel indicates which input each trimmer refers to. The sensitivity of the various inputs can be adjusted using the trimmers within the limits described.

- Stereo or Mono mode

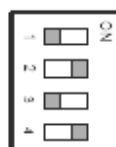


Switch 1: ON = Mono OFF = Stereo  
Switch 2: No use

- Stereo pre emphasis



50 us



75 us

- Left and right input impedance



Switch1: ON = 600 ohm, OFF = 10kohm  
Switch2: ON = 600 ohm, OFF = 10kohm

## 2.4 Front panel control

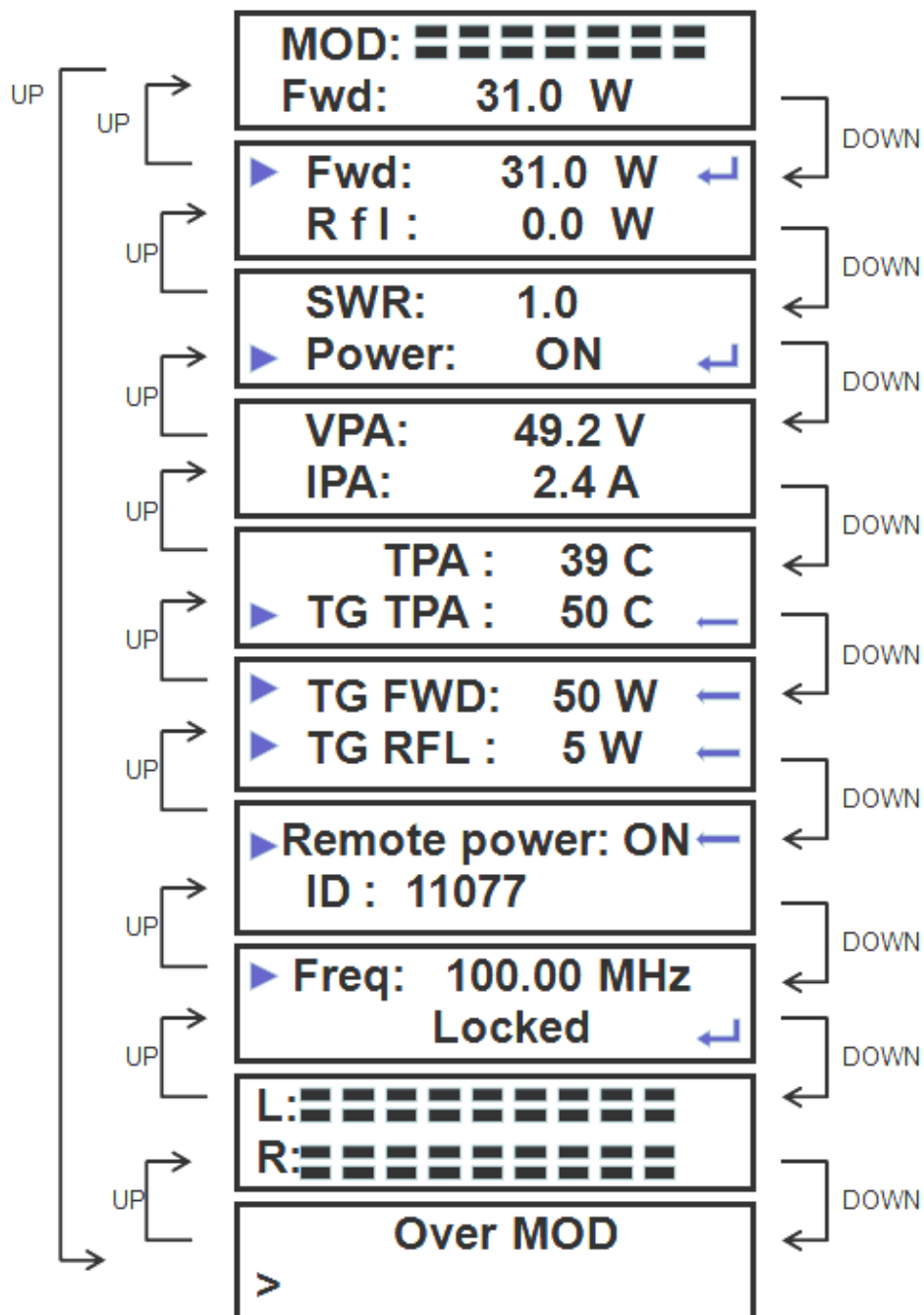
The machine is provided with a two-line LCD display where a set of menus is shown

When turned on, the LCD display shows the predefined screen with the graphic representation of the instantaneous modulation level and indication of the direct power supplied:



The vertical bars under "MOD" indicate the progress of the modulation in real time; the hatched bar signals the maximum nominal modulation level of 75 kHz (100%).

To change the menu, select the UP or DOWN push button, the screen that is shown in following:

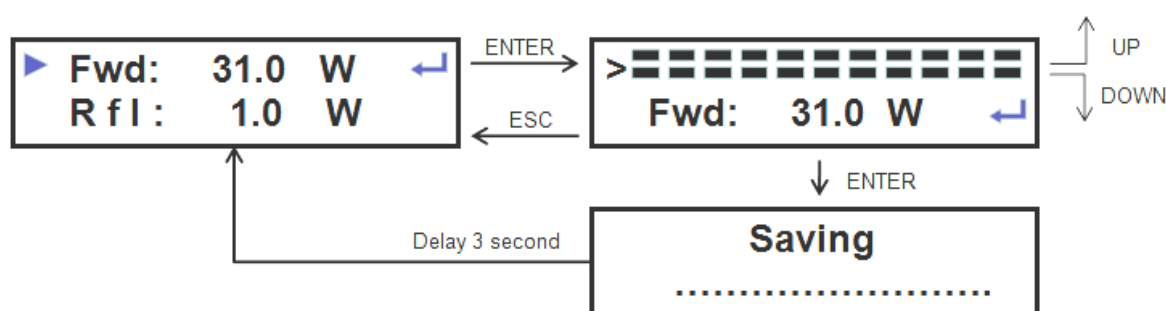


### 2.4.1 Power setting

To change the set power level, select the menu power as below,



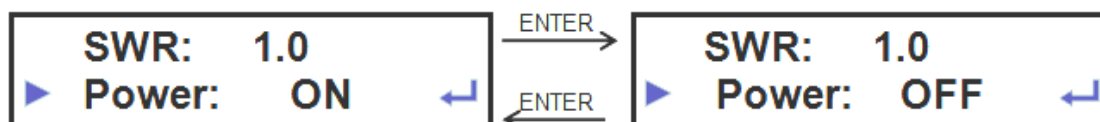
Keep the ENTER push button. The screen that is show in the modification mode is similar to the following:



To increase the level, press the UP push button and to reduce it, press DOWN. As the set level increases or decreases, the bar becomes longer or shorter to display the current setting. When the designed level is reached, press ENTER to confirm and exit the predefined menu.

### 2.4.2 RF Power ON/OFF

To change the RF power ON or OFF, select the menu power as below,

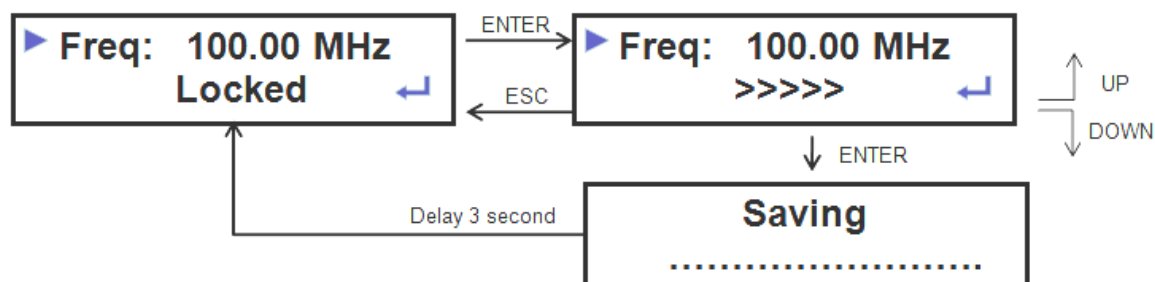


### 2.4.3 Frequency setting

This menu lets you read and set the operating frequency.



Keep the ENTER push button. The screen that is show in the modification mode is similar to the following:



By pressing the ENTER push button, you can modify the set frequency using the UP (the frequency increases) and DOWN push buttons. After having set a new frequency value, press the ENTER push button to confirm the choice. The exciter will release from the current frequency and it will latch onto the new operating frequency.

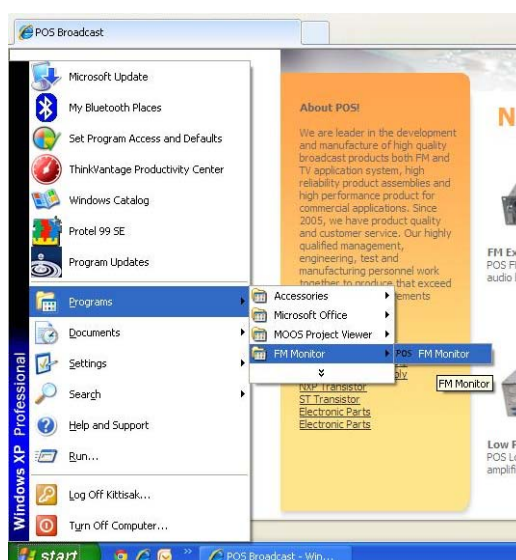
## 2.5 Software control

### 2.5.1 Software installation

To get the software, you can get software by CD Rom or download from [www.posbroadcast.com](http://www.posbroadcast.com). Then, you can easy installation software on your computer.( refer to Window application)

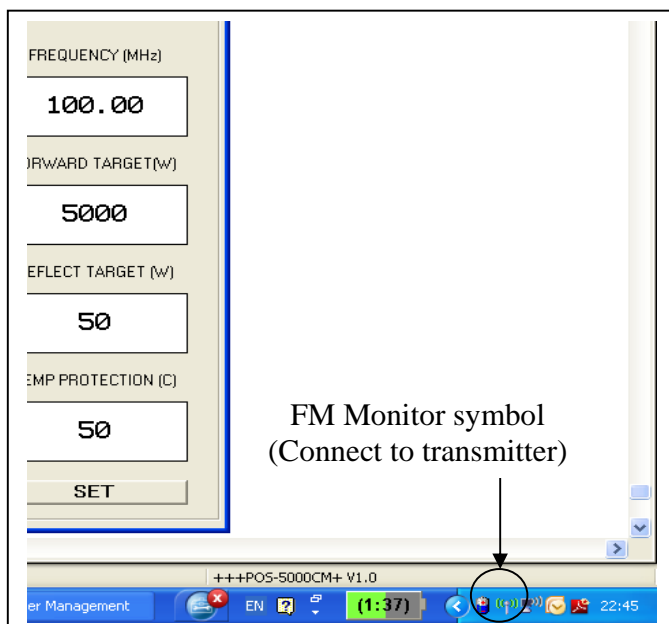
### 2.5.2 Software monitor

When, you connect to the transmission via RS232 port and turn on, you can open the software by the ways as

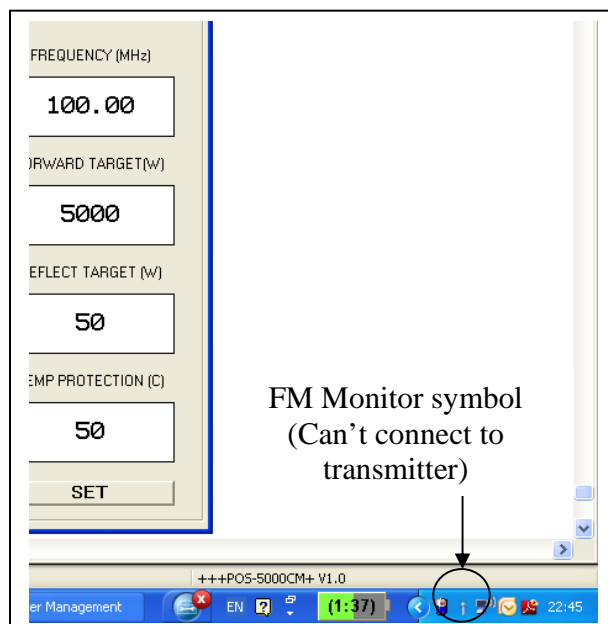


After click open the software FM Monitor, you can get the symbol on bottom-right on your computer.

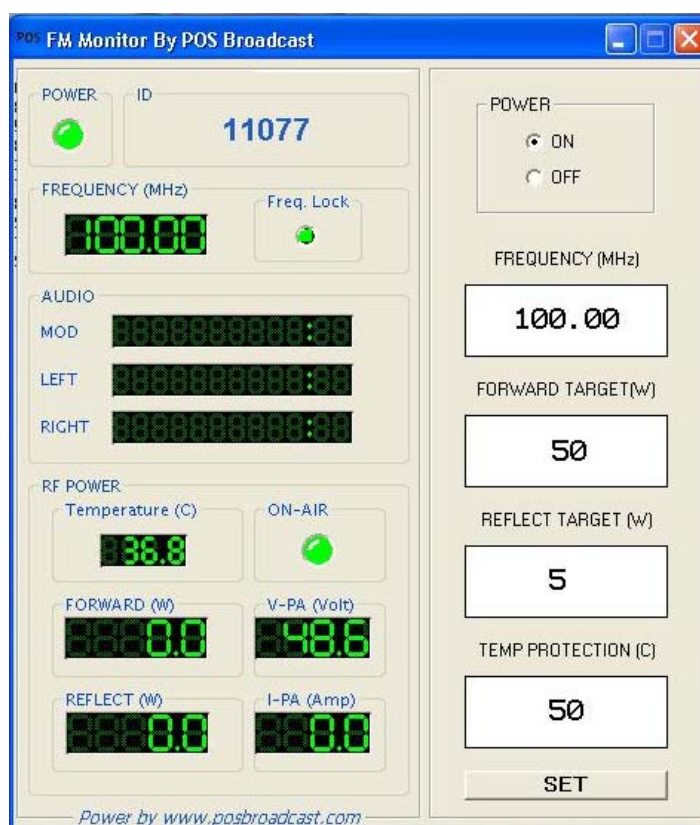
Connected to transmitter



Can not connected to transmitter



Double click on the FM Monitor symbol; the software will be show as

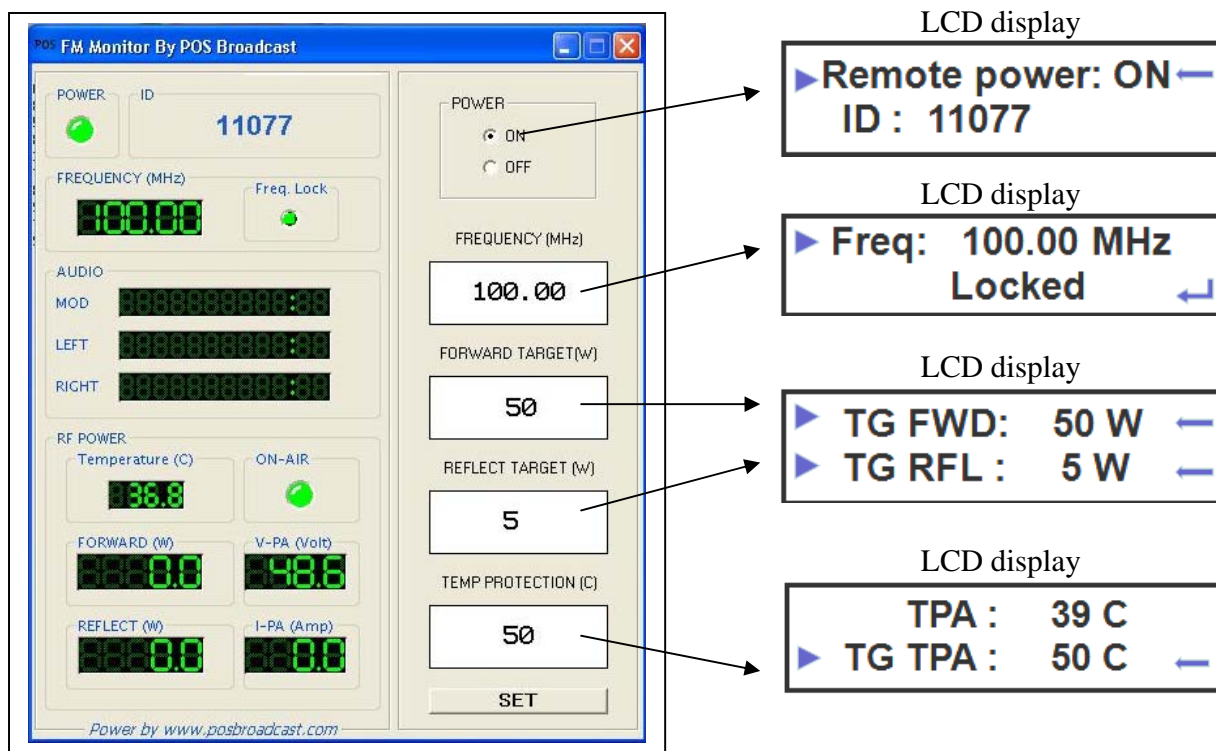


### 2.5.3 Software configuration

You can set the value as you're requested. Then click SET, The parameter will be show and change on LCD of the transmission.

- Power set > ON, the RF output of transmission is on.  
OFF, the RF output of transmission is stanby.
- Frequency set > the values for frequency use.
- Forward target set > the values for RF output of transmission limit.
- Reflect target set > the values for maximum RF power reflect of transmission protection limit.
- Temp protection set > the values for maximum temperature of transmission protection limit.

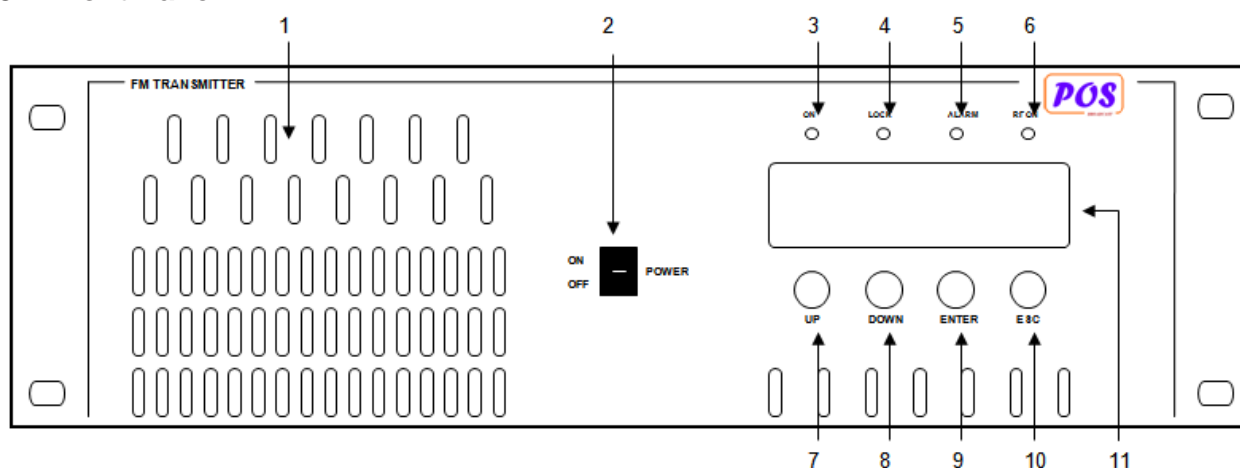
The value from software FM Monitor should be related to LCD of transmission



## 3. External Description

This chapter reports the elements of the front and rear panels of the POS-1000T+ with a brief description of each of them.

### 3.1 Front Panel



[1] AIR FLOW

[2] POWER

[3] ON

[4] LOCK

[5] ALARM

[6] RF ON

[7] UP

[8] DOWN

[9] ENTER

[10] ESC

[11] DISPLAY

Grid for the intake of the air flow of the forced ventilation  
ON/OFF switch. This switch disables the exciter without disconnecting the mains supply

Green LED, light when the exciter is working

Green LED, light when the PLL is locked on the working frequency

Red LED, light when the alarm function is operating (Low power, high reflect power, high SWR or high temperature)

Green LED, light when the exciter's power output is on.

Push button to increase value.

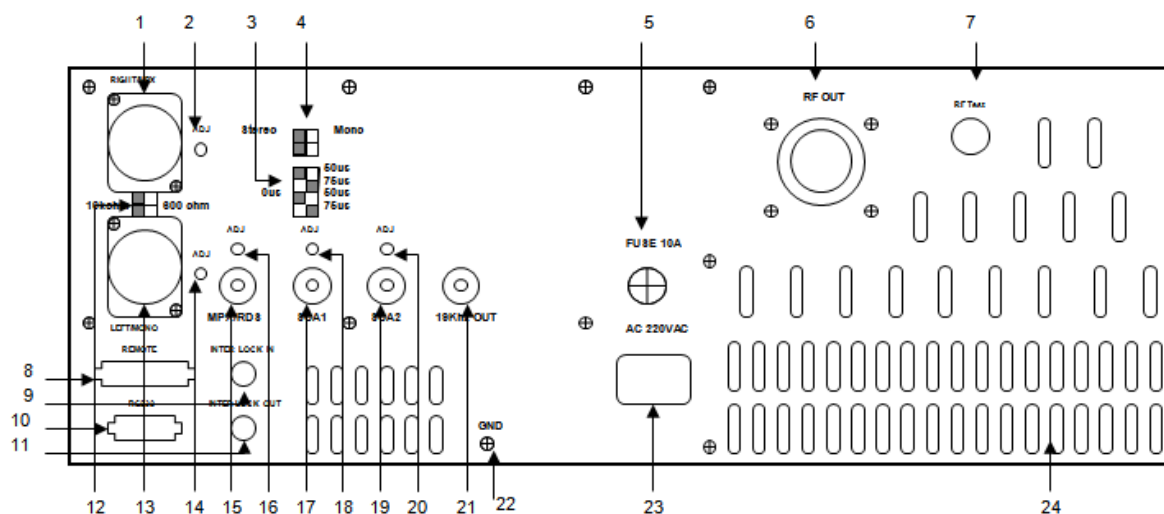
Push button to decrease value.

Push button to confirm a parameter.

Push button to change and exit from a menu.

Liquid crystals display

### 3.2 Rear Panel



- [1] RIGHT/MONO
- [2] RIGHT/MONO ADJ
- [3] PREEMPHASIS

XLR connector, balanced Right channel input  
Adjustment trimmer for the Right channel input.  
Dip-switch to set the pre emphasis at 50 or 75  $\mu$ s. The pre emphasis setting is only relevant for the Left and Right inputs in stereo mode and for the mono input in mono mode, while MPX input is unaffected by this setting.

- [4] MODE
- [5] FUSE

Dip-switch to set the operation mode (STEREO or MONO).  
Fuse holder. Use a screwdriver to access the fuse Contains the general protection fuse rated 15 A

- [6] RF OUTPUT

RF output connector, 7/16-type, 50 $\Omega$ .

- [7] RF TEST

RF test output, approx. -60 dB of the RF output power level

- [8] REMOTE

DB15 connector for telemetry of the machine.

- [9] INTERLOCK IN

BNC interlock in connector: the exciter is forced in stand-by mode when the inner conductor is grounded.

- [10] RS232

DB9 connector for interconnection with other devices and for factory parameters programming

- [11] INTERLOCK OUT

BNC interlock out connector: the inner short to ground when alarm is on.

- [12] IMPEDANCE

Dip-switch to set the balanced input impedance, 600 $\Omega$  or 10k $\Omega$

- [13] LEFT-MONO

XLR connector, balanced Left-Mono channel input.

- [14] LEFT-MONO ADJ

Adjustment trimmer for Left-Mono channel input

- [15] MPX/RDS

BNC connector, MPX unbalanced input.

- [16] MPX/RDSADJ

Adjustment trimmer for MPX input.

- [17] SCA 1

BNC connector, SCA1 unbalanced input

- [18] SCA1 ADJ

Adjustment trimmer for SCA1 input

- [19] SCA 2

BNC connector, SCA2 unbalanced input

- [20] SCA2 ADJ

Adjustment trimmer for SCA2 input

- [21] 19 KHZ OUT

BNC output for the 19 kHz pilot tone. This can be used for external devices (e.g. RDS coders) synchronization

- [22] GND

Ground connect to earth

- [23] PLUG

Mains supply plug, 180 - 240V 50-60 Hz

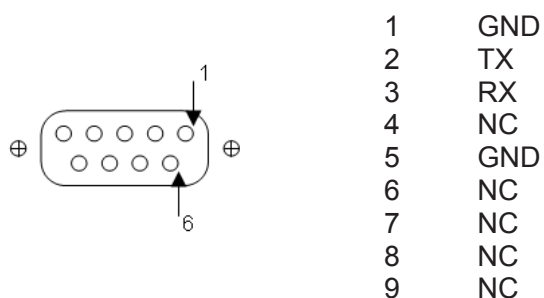
- [24] AIR FLOW

Grid for the intake of the air flow of the forced ventilation

### 3.3 Connector Description

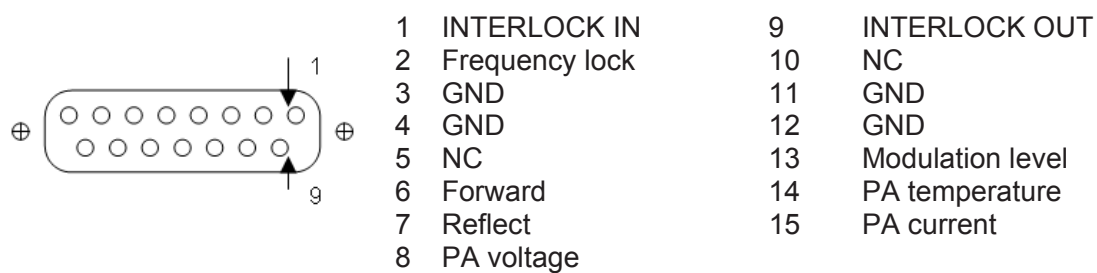
#### 3.3.1 RS 232

Type: DB9 female



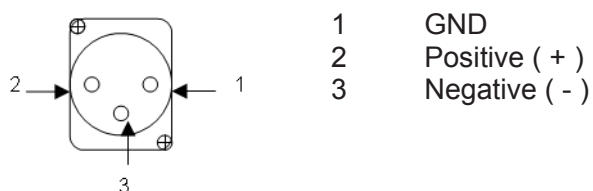
#### 3.3.2 Remote

Type: DB15 female



#### 3.3.3 Audio input LEFT/RIGHT

Type: XLR female



## 4. Technical Specifications

### 4.1 Physical specifications

Panel size	483 mm (19") x 132 mm (5 1/4") (3U)
Depth	610 mm (24")
Weight	20 Kg
Working Temperature	0 °C ÷ 50 °C

### 4.2 Electrical specifications

#### General

RF output power	0 to 1000 W, adjustable
RF output connector	7/16 – type Female
RF output impedance	50 Ohm
Frequency range	87.5 MHz ÷ 108 MHz
Frequency setting	software programming
Frequency step	50 KHz (10 KHz on request)
Frequency stability	±2ppm from -10°C to 50°C
Modulation type	direct carrier modulation
Spurious and Harmonics suppression	respects FCC and CCIR standards (Typical -75 dBc)
Modulation capability	respects relevant FCC and CCIR standards
A.C. power supply	≅ 180 V ÷ 240 V
Power consumption	1700 VA

#### Input

Left, Right and Mono Input	Type: XLR female balanced
MPX input	Type: BNC, unbalanced
Input impedance	balanced input: 600 or 10 k Ohm selectable
MPX input impedance	unbalanced input 10 k Ohm
Input level	-13 dBm ÷ +13 dBm, adjustable
Pre emphasis	Selectable: 0 50 us (CCIR) 75 us (FCC)
SCA/RDS input	3 BNC unbalance
SCA/RDS input impedance	10 kOhm
SCA/RDS input level	-20 dBm ÷ +13 dBm, adjustable
SCA/RDS amplitude/frequency response	± 0.2 dB, 40 kHz to 100 kHz

#### Output

RF Out	7/16 – type Female, 50 Ohm
RF test	BNC connector, -60 dB.
19 kHz pilot tone output	BNC connector, 1.3 Vp-p.



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**MONO operation**

S/N	> 70dB
Amplitude frequency response	$\pm 0.5$ dB, 20Hz ÷ 15 KHz
Total harmonic distortion (THD)	< 0.05%

**MPX operation**

Composite S/N	> 70dB
MPX amplitude frequency response	$\pm 0.1$ dB, 20 Hz ÷ 53 KHz $\pm 0.2$ dB, 53 KHz ÷ 100 KHz
MPX Total harmonic distortion (THD)	< 0.02 %
Stereo separation	> 50 dB

**Stereo operation**

S/N FM Stereo	> 70 dB
Audio frequency response	20 Hz ÷ 15 KHz
Total harmonic distortion (THD)	$\leq 0.05$ %
Stereo separation	> 50 dB

**Connections**

Interlock connector	2 BNC
Serial interface	DB9 female RS232
Remote	DB15 female

## 5. Working Principles

### 5.1 Power Supply

POS-1000T+ power supply is a switching type of unit, and its main 24V 2.5A, 12V 8.5A and 48 V 32A output feeds the RF amplifier and regulate broad of the machine. The power supply is connected to voltage between 180 and 240 V without having to make adjustments or manual settings.

### 5.2 Regulate Board

The regulate board for generating continuous 5 V 12V 15V and 20 V voltages for powering the other circuits on the device are present on the power supply.

### 5.3 LCD Board

The LCD board contains the microcontroller (PIC18F458) that implements the machine's control software, the display and the other components needed to interface the user. The board interfaces with the other machine modules, both for power supply distribution and for the control and measures.

### 5.4 Fuse Board

The fuse board contains the fuse, current, temperature and voltage sensor. The board interfaces with the other machine modules, both for power supply, power amplifier and for the control. This circuit carries out the following functions:

- Measures current and voltage
- Measures temperature

### 5.5 Control Board

The control board contains the measure and control parameter (forward, reflect, voltage, current, temperature, bias etc.). The board interfaces with the other machine modules, both for LCD and power amplifier board.

### 5.6 PLL/VCO/Encoder Board

The PLL/VCO/Encoder board card carries out the following functions:

#### 5.6.1 Encoder section

The encoder audio input section contains the circuits that perform the following functions:

- Input impedance selection
- 15 KHz filtering
- Pre emphasis selection
- Mixing of the signal, MPX and SCA channels
- Stereo multiplexing
- 19 KHz generate
- Measurement of the modulating signal
- Measurement of the left and right signal

### **5.6.2 PLL section**

The PLL section of the card generates the signal in modulated radio frequency. It is based on a PLL diagram that uses an MC145170 type of integrated PLL. For frequency reference use to 4.000 MHz

### **5.6.3 VCO section**

The VCO section of the card generates the signal in fm band 87.50 – 108 MHz. It is based on a VCO diagram that uses to 8 varicap tuning diode and MAR-8 low noise amplifier.

## **5.7 Interface Board**

The interface board needed to interface from LCD board and external machine for setup or monitoring.

## **5.8 Driver Board**

The RF signal coming from the VCO, is amplified and is then sent to the first stage that sees to its amplifications up to 30W. The amplifier is made in two stages. The first is made with BGF35, and the last with one BLF175.

## **5.9 Power Amplifier Board**

The final power stage is enclosed in a totally shielded metal container fastened in the centre of the device. The RF signal coming from the exciter sent to the splitter, amplifier, combiner, low pass filter and directional coupler stage that sees to its final amplifications up to 1000W. The amplifier is made in three modules. Every RF module supplied up to 350W. This active device used in amplifier module is a Mosfet (SD2942). These amplifier modules combine with Wilkinson Splitter and Combiner in strip line.

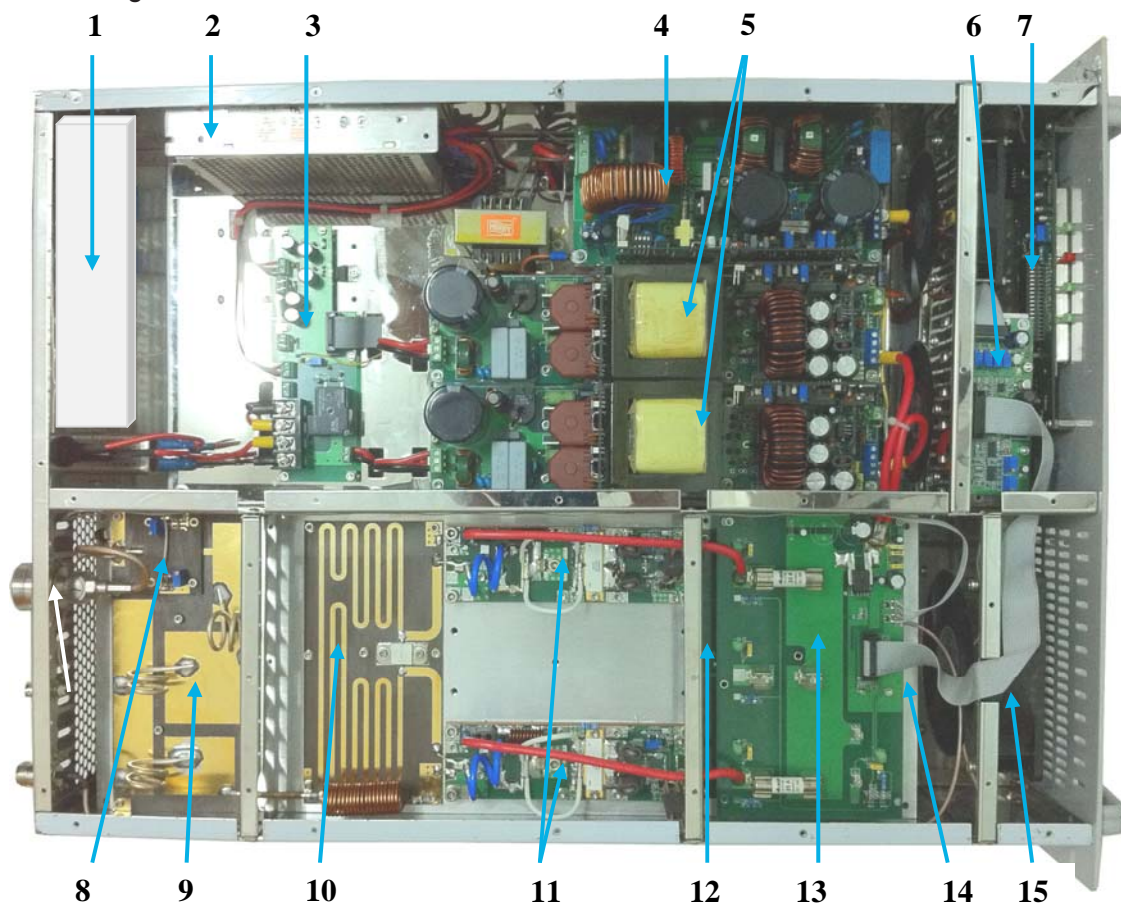
## **5.10 LPF Board**

This board is mean Low Pass Filter (LPF) is function is to suppress the harmonic components generate by the amplifier below the level required by regulations. This board includes a direction coupler, is function is the measurement of the forward, reflect output power and RF sample at –60dB.

## 6. Internal Description

### 6.1 Top view

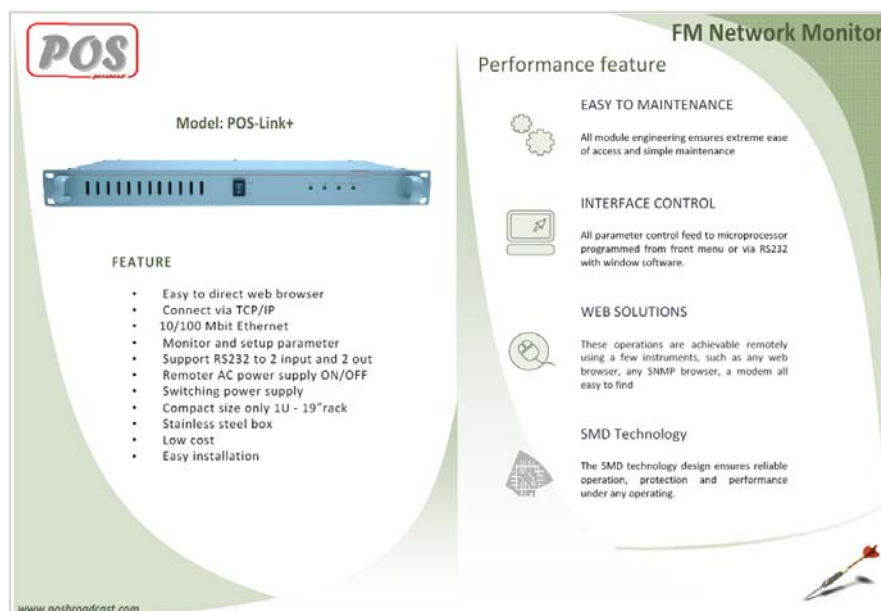
The figure below shows the view from above the machine,



1. PLL/VCO/Encoder board
2. Power supply 12V 8A
3. Regulate board
4. Power factor correction unit
5. Power supply unit 32A @48V
6. Control board
7. LCD board
8. Directional coupler
9. Low Pass Filter
10. Power Combiner
11. Power amplifier ( SD2942 X 3 )
12. Power Splitter
13. Fuse board
14. Coupler power input board
15. Blower

## 7. Web browser application

You can monitor and configuration all parameter to transmitter via web browser. It easy to connect anywhere and update status your transmitter. Please see application on [www.posbroadcast.com/telemetry](http://www.posbroadcast.com/telemetry)



Google Search More >>

### Network Monitoring System

On Time : 0 Day 0 Hour 51 Minute 27 Sec.

Items	FM Exciter	FM Amplifier
Station On Time	0 Day 0 Hour 1 Minute 50 Sec.	0 Day 0 Hour 10 Minute 58 Sec.
Station ID	11701	11501
Power	ON	ON
ON AIR	ON	-
Frequency (MHz)	104.25	-
Modulation Level (%)	72	-
Signal Level Left (%)	81	-
Signal Level Right (%)	96	-
Frequency Lock	ON	-
Power Forward Output (Watts)	14.0	1540.0
Power Reflect Output (Watts)	0.2	5.0
PA Temperature (°C)	35.0	41.0
PA Voltage (V)	49.0	41.8
PA Current (A)	0.6	49.0

Refresh